We claim:

1. A method for identifying a cost-minimizing bid set for reverse combinatorial auctions where all-or-nothing bids are allowed, said method comprising:

introducing a decision variable for each bid;

introducing a counting variable to indicate whether bids from a supplier are chosen in an optimal bid set;

modeling demand constraints for each item using the bid variables;

modeling minimum and maximum numbers of suppliers based on the counting variables;

introducing dummy variables to ensure existence of feasible solutions;

for a given cost, formulating an objective of choosing bids that arrive early based on an additional timestamped objective with the given cost level as a constraint; and

introducing price modifications to handle the formulated objective of choosing bids that arrive early.

2. The method of claim 1, wherein the auction is a single-round auction.

3. The method of claim 1, wherein the auction is a multiple-round auction.

4. A method for implementing a reverse combinatorial auction in which items of varying quantities are purchased, comprising:

(a) defining one or more parameters for the auction;

(b) accepting bids for a plurality of items in the auction;

(c) creating a set-covering formulation from said bids;

(d) adding predetermined business rules as a constraint to the set-covering formulation;

(e) automatically generating a computer-implemented representation of the set-covering formulation as constrained by said business rules; and

(f) determining a cost-minimizing bid set based on an implementation of the computer-implemented representation.

5. The method of claim 4, wherein said parameters include information identifying the auction as at least one of the following: a single-round or multiple-round auction; an open-cry or sealed-bid auction; an auction with or without reservation; and potential suppliers.

6. The method of claim 4, wherein step (e) includes:

creating a constraint matrix corresponding to the set-covering formulation;

determining a size of and a number of non-zero entries in the constraint matrix based on said one or more parameters;

modifying the size of the constraint matrix to account for dummy bids added to the set-covering formulation;

creating an array for said constraint matrix; and

populating the array based on the set-covering formulation.

7. The method of claim 6, wherein said step of determining non-zero entries in said constraint matrix includes:

defining respective indexes for said suppliers and a number of bids for each of said suppliers;

generating an item vector for each of said bids;

determining a number of items in each item vector;

adding the number of items in each item vector to a count of non-zero entries for each bid of each of said suppliers;

for each of said suppliers, increasing the count by a predetermined number to account for counting variables; and

updating the count to add non-zeros for the dummy variables.

8. The method of claim 6, wherein said step of creating a constraint matrix includes:

initializing a supplier index, a non-zero count variable, and a column count variable;

acquiring information corresponding to a first supplier bid;

acquiring an item vector for the first supplier bid;

updating an initial objective value for a decision variable;

for each non-zero item in an item vector, introducing a non-zero entry in the constraint matrix;

for each bid, add two non-zero entries for a min/max quantity constraint; and

adding the non-zero entries for the counting variables.

9. The method of claim 8, wherein said step of adding non-zero entries includes:

introducing a non-zero entry for a minimum quantity constraint and a maximum quantity constraint;

adding a non-zero entry for a minimum number of suppliers constaint; and

adding non-zeros associated with a dummy variable.

10. The method of claim 4, further comprising:

populating arrays associated with constraints in accordance with steps that include:

initializing an index for items and suppliers;

defining lower and upper bounds for each of a plurality of demand constraints;

defining the lower and upper bounds for a min/max quantity constraint; and

defining lower and upper bounds for a minimum number and a maximum number of supplier constraints.

11. The method of claim 4, wherein step (f) is performed by an LP/IP solver.